



FLENDER GEAR UNITS

DREDGER POWER AND PROJECT EFFICIENCY.

Comprehensive support and reliable products meet
all your dredging, pumping and propulsion demands.

flender.com

FLENDER



As a system provider, Flender's portfolio features the full spectrum of gear units that dredgers require.

THERE ARE FLENDER GEAR UNITS FOR:

- Propulsion drives
- Cutter head drives
- Suction and pump drives
- Jet pump drives
- Generator drives

Along with pump and propulsion gear units, we also offer especially effective cutter gear units. Having a contact who can handle all the requirements is hugely beneficial.



WITH THE CUSTOMER FOR THE CUSTOMER.

We have been supplying our NAVILUS® gear units to the shipping industry for many decades. Moreover, it is our extensive experience with equipping dredgers that underpins our ability to offer high-quality and application-specific drive components. Along with reliable products, perfect project management is no less of a key factor in the successful fulfillment of a charter. That's why we put all of our expertise and skill to work for our customers.

High-end engineering

Extremely high efficiencies, optimum power-to-weight ratios, and minimal vibration and noise levels characterize our products. Although the various gear units used on a dredger are designed for their specific applications, most are custom-manufactured according to project-based customer specifications. Therefore as our customer, you can always be sure of top reliability, durability and optimum efficiency with minimum maintenance costs.

Available as single- or two-speed variants, our propulsion gear units range from SISO gear units starting from 1 MW to TWISO gear units of up to 50 MW. They can be equipped with versatile PTO, PTH and PTI options. This puts all energy production, redundancy and hybrid options onboard and also makes it possible to operate powerful pumps or cutter drives.

Your project in the best of hands

Our broad range of systems and products can satisfy an extremely wide range of requirements. Depending on the task, we can apply proven standard solutions or work together with the customer to implement special design specifications.

Along with global customer support and service, the main factors behind successful collaboration include high availability and, above all, punctual delivery.

Our experience on the process, product and system level helps us better serve our customers. We develop more than just the gear units, we also develop the auxiliary equipment and the schematics. Digitalization in project management and in the design process makes our processes fast and flexible. Proposals are issued rapidly and 3-D design drawings can be shared electronically.

One face to the customer

We achieve extremely high reliability and loss-free information channels through the integration of key account managers within the project team. Always up to date with all essential project details, they can support the customer as their competent partners throughout the project straight through to the after-sales phase.

So expect the best consulting services, backed up by industry knowledge, practical focus and expertise covering the entire drive train, together with open communication to ensure the success of your project.

SUCCESS IN THREE STAGES.

MOHAB MAMEESH AND HUSSEIN TANTAWY

Type of ship	Cutter dredger
Shipyard	Royal IHC, NL
Owner	Suez Canal Authority
Year	2019
Cutter	Electric
Rated power	2 x 2,400 kW
Flender	NAVILUS G3VE 1900
Pump	Electric
Rated power	3,000 kW
Flender	NAVILUS G1EE 950
Pump	Diesel
Rated power	6,170 kW
Flender	NAVILUS G1EE 750

MISSION

The work of a cutter dredger is one of the hardest jobs for a drive. Power, strength and durability are key parameters here.

FLENDER SOLUTION

Custom-made for this specific application with three stages and a transmission ratio of 41:1, this cutter gear unit has adequate power reserves and nevertheless operates economically. Its integrated thrust bearings also help get the job done.

SUEZ CANAL
3 STAGES CUTTER
POWER

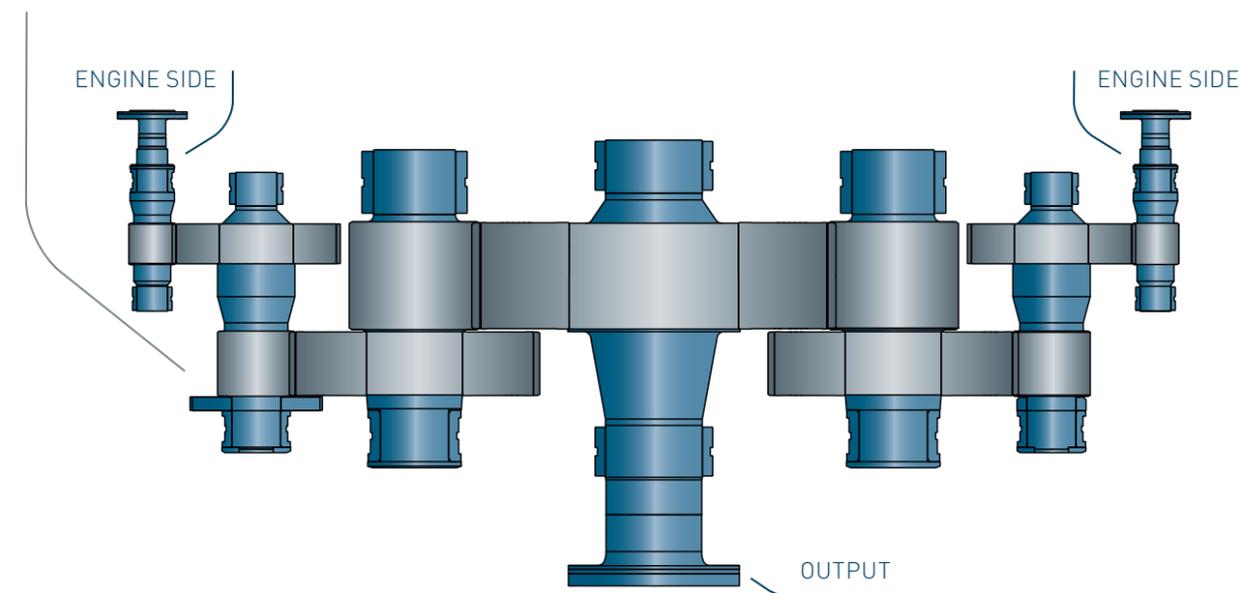
THE GEAR UNIT CONCEPT FOR EXTREME LOADS.



From their robust design configuration to their precision gear tooth geometry, our NAVILUS cutter gear units are made for strength and durability.



NAVILUS GV3E
3-stage cutter gear unit



A cutter head transmits tremendous forces. And the mechanical loads that the cutter rig exerts on the gear unit are just as high.

With tailor-made concepts for housing designs, transmission ratios and single- or multi-stage configurations, our NAVILUS cutter gear units are designed to be both robust and compact.

In order to develop cutter drives that always focus on the solution, we can equip them with holding brakes, water-tight seals for variable depths, and integrated or separate thrust bearings. And we also recommend establishing an integrated condition monitoring program, even during the design phase of a drive project, to avoid the need for unscheduled maintenance.

The mounting position of a cutter gear unit makes uniform oil distribution particularly important. The oil supply systems that we have developed can perform this task as a freestanding module or in a configuration mounted to the housing.

YOUR BENEFITS

- Rated power from 1,000 kW
- Multi-stage design with transmission ratios up to 45:1
- Vertical or horizontal shaft offset
- Project-oriented design according to customer specifications
- Welded housing design
- Low-vibration
- Compact design
- Extremely high efficiency
- Optimum power-to-weight ratio
- Complete with auxiliary equipment

COMPACT, YET PERSISTENTLY STRONG.

ARZANA

Type of ship	Trailer Suction Hopper Dredger, TSHD 6,000 m ³
Shipyard	Royal IHC, NL
Owner	National Marine Dredging Company
Year	2017
Class	BV
Propulsion	Diesel
Output	2 x 4,240 kW
Flender	2 x NAVILUS GUBK 630
Pump	Electric
Rated power	3,750 kW
Flender	NAVILUS G1EE 710
Pump	Electric
Rated power	325 kW
Flender	NAVILUS GAA 355

MISSION

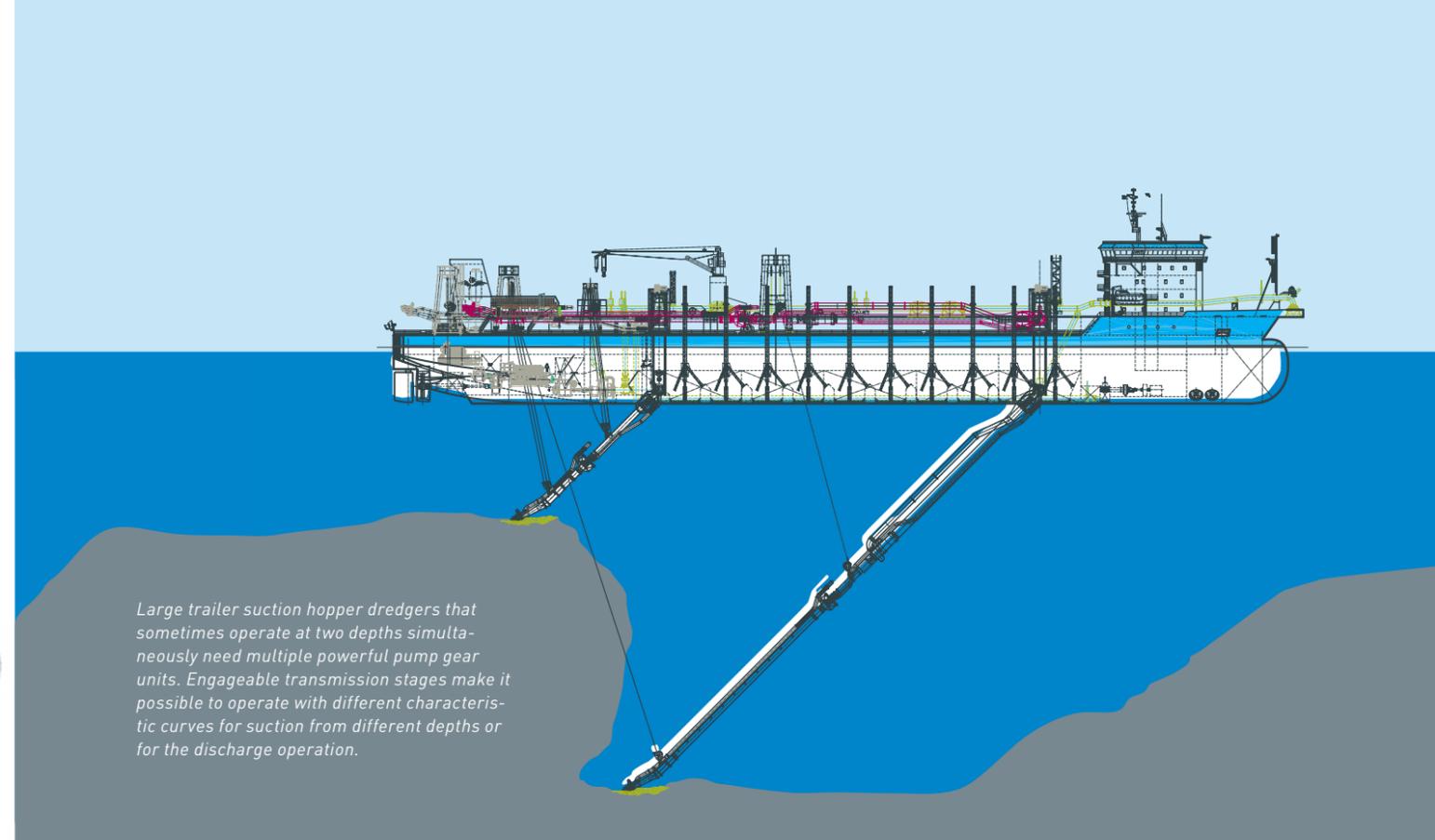
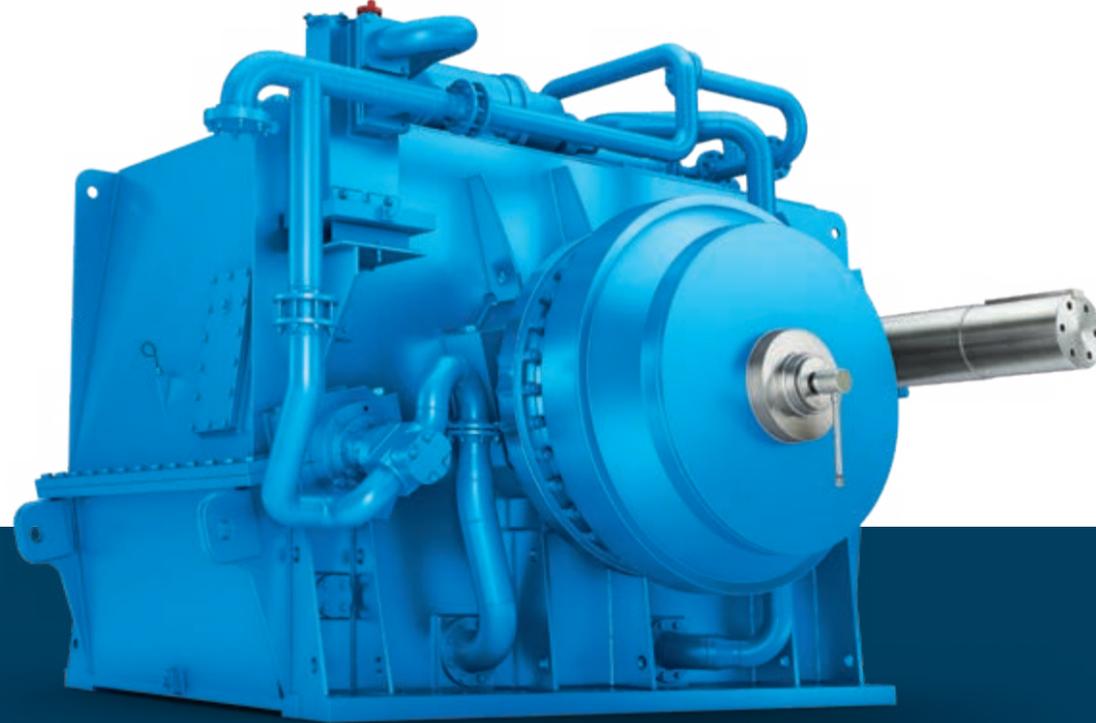
All over the world, trailer suction hopper dredgers are deployed to keep shipping channels free or deposit sediments on land. The drives used for propulsion and for generating electricity are often designed to operate in concert with the ones that handle the pumping and suction.

FLENDER SOLUTION

With two SISO propulsion gear units including primary PTO and two separately configured variable-speed pump gear units, Flender was able to contribute a well-matched system to the shipbuilding project.

ROBUST
MAXIMUM TORQUE
DURABILITY
SYSTEM

SPECIFICATIONS THAT GET RIGHT TO THE OPERATING POINT.



Large trailer suction hopper dredgers that sometimes operate at two depths simultaneously need multiple powerful pump gear units. Engageable transmission stages make it possible to operate with different characteristic curves for suction from different depths or for the discharge operation.

Because we have decades of experience, we can provide highly customized gear units for pump drives from our proven standard components.

To precisely maintain the optimum operating point – where the pump curve and the system curve intersect – our pump and jet pump gear units from the NAVILUS series offer a number of different possibilities. Multiple speeds can be planned and disengaging clutches can be installed. With single- or multi-stage gear units, we design in the optimum torque for the drive. As a result, also pump drives installed in series can be perfectly coordinated and operated.

We also take especially heavy-duty operation into consideration when developing customer-specific gear units: this is clearly borne out by their solid construction and precision gear and bearing design.

YOUR BENEFITS

- Power ratings up to 20,000 kW
- Single- or multi-stage design, transmission ratios up to 8:1
- Vertical, horizontal or diagonal shaft offset
- Multiple speeds possible
- Project-oriented design according to customer specifications
- Welded housing design
- Pneumatically operated clutches
- Easy access to the installed clutches
- Low-vibration
- Compact design
- Extremely high efficiency
- Optimum power-to-weight ratio
- Complete with auxiliary equipment

THERE ARE NO GEAR UNITS WITHOUT COUPLINGS.



Our large portfolio of couplings also provides solutions for connecting cutter or pump gear units in the drive train. They are characterized by their long service life, low maintenance requirements and compact design, and ensure reliable torque transmission even under harsh operating conditions.

The N-ARPEX® all-steel multi-disk coupling is backlash-free, torsionally rigid and flexible with axial, angular and radial offset compensation.

Our RUPLEX® is a damping, fail-safe pin and bush coupling for medium to high torques. The conical seat of the buffer pins facilitates easy assembly.

The double-jointed gear couplings of the ZAPEX® series compensate for angular, parallel and axial misalignment of shafts.

SPECIFIC SOLUTIONS SET THE STANDARD.

SHANTI SAGAR 17 AND SHANTI SAGAR 18

Type of ship Trailer Suction Hopper Dredger, TSHD Beagle 8

Shipyard Royal IHC, NL

Owner Adani Group India

Year 2017

Class LR

Propulsion Diesel

Output 2 x 3.600 kW

Flender 2 x NAVILUS GMCK 670

Pump Diesel

Rated power 2 x 1,430 kW

Flender 2 x NAVILUS G1EE 520

MISSION

Continuously pumping huge quantities of dredging material is a challenging job for a gear unit. Robust strength is absolutely essential here.

FLENDER SOLUTION

The two exceptionally stable NAVILUS pump gear units were specifically designed for these two trailer suction hopper dredgers. For the propulsion system, two NAVILUS SISO gear units with primary PTO were used.



GLOBAL PARTNERS AND SERVICE.

Our global presence enables us to provide our comprehensive expertise and large product portfolio the world over. A seamless network of Flender subsidiaries and Flender representatives makes contacting us fast and easy.

Also known as Bruinhof Marine, Flender B.V. is the global Lifecycle Support Unit of Flender, enabling us to specialize in the worldwide delivery of spare parts and the deployment of service technicians. Both functions support the full mechanical drive portfolio, comprising propulsion, generator and dredger gear units as well as couplings, clutches and shaft bearings.

Commissioning by experts

Complex equipment must be professionally installed and put into operation to ensure their long service life. To assure this function, we have an experienced start-up team that inspects the installation, tests the alarm systems, calibrates the sensors and conducts load and performance tests.

Monitoring your gear unit

To prevent damage and breakdowns, initial symptoms must be recognized early. With that in mind, and to maintain the optimum reliability of your gear unit, we offer you our condition monitoring service. As gear unit specialists, we use analysis, diagnostics and inspection to ensure that your drive is well maintained. In this context, we can use remote diagnostics, mobile vibration analyses, acceptance measurements or load and torque measurements, inspections and endoscopic inspections. Online, with continuous remote support and analysis, or offline, with a visit by our engineers. Above all, condition monitoring makes it possible to schedule rational maintenance intervals.

Preventive maintenance

You can also improve the availability of your drives through our preventive maintenance service. Regular measures specifically suited to the age and operating hours of the gear unit help you maintain its optimum operating condition.

Visit our websites listed on the back of this brochure. They provide various contact options.



WORLDWIDE RESPONSIBILITY.

Flender is a reliable partner whose business relationships are based on trust and responsibility. Qualified and dedicated employees are the key to our innovative strength, performance and consulting expertise. That's why we continuously invest in training and continuing education, provide progressive working conditions and believe that diversity enriches our work environment.

But we do not want our responsible actions to be confined to our company. We develop our processes in a way that makes our products and production as eco-friendly as possible. We are particularly proud of the fact that by the end of 2022 our power consumption will be carbon-free. We have also initiated various projects to reduce waste, optimize recycling and avoid harmful substances.

Our products also have an impact on the environment. We bear that in mind in our material selection and manufacturing, and view their high quality and the resulting long useful life as beneficial to the environment. With its harmonized torque spectrum, our product portfolio always enables users to select the right gear unit size, thereby significantly increasing energy efficiency.

As a company with global operations, we are also aware of our global impact. Accordingly, along with ecological issues, economic and social ones are also important to us. We also want to take a lead role here and continuously align our actions with the 17 Sustainable Development Goals of the UN. With the ambition of enabling all people to lead a dignified human existence while permanently protecting the natural basis for life at the same time.



For more information about NAVILUS gear units
www.flender.com/en/industry/marine

For more information about marine services
www.flender.com/en/bruinhofmarine



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MOVE^{the}
WORLD

Flender International GmbH

Alfred-Flender-Straße 77
46395 Bocholt
Germany

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